

REMARKS

The application has been reviewed in light of the Office Action mailed on November 15, 2004. Applicants acknowledge with appreciation the indication that claims 1-8 and 10-41 are allowable.¹ Reconsideration of rejected claims 42-46 and 48-57 is respectfully requested based on the following remarks.

Claims 42-46 and 48-57 stand rejected under 35 U.S.C. 102(a) as being anticipated by Koduri, U.S. Patent No. 6,273,321 (hereinafter "Koduri"). Reconsideration is respectfully requested.

Claim 42 recites a "mechanism for moving and operating [a] device such that [the] device forms a first wire bond from a first surface to a second surface, and forms a second wire bond from said second surface to a third surface." An exemplary embodiment of this feature is shown, for example, in Figure 5B which shows a first wire bond 54 formed from a first surface (on component 30) to a second surface (on component 32), and a second wire bond 60 formed from the second surface to a third surface (on component 34). Claim 42 further recites that the wire bonds are formed such that the "first and second wire bonds are electrically connected on said second surface." An example of this feature of claim 42 can be seen, for example, with reference to Figures 5B and 6, which show the wire bonds 54 and 60 electrically connected on a surface of component 32. The invention is not limited by the exemplary embodiments.

Claim 42 also recites that the "second wire bond is formed at an angle with respect to said first wire bond in a horizontal plane." An embodiment of this feature is illustrated, for example, with respect to Figure 6 which shows an angle 74 in the horizontal plane between the wire bonds 54 and 60. Again, these exemplary embodiments do not limit the claims.

¹ The Office Action Summary indicates that claims 1-8 and 10-41 are allowed, but the Office Action, on page 3, indicates that claims 1-13 and 18-41 are allowed. Since claims 14-17 are not rejected, Applicants assume that these claims are allowed, as indicated on the Office Action Summary.

Koduri fails to teach or suggest these limitations. Koduri discloses a bonding apparatus 18 having a capillary 40. With reference to Figure 4, Koduri shows its apparatus in use over a circuit chip package 80, which has a chip 82 with bond pads 83 and leads 85. In use, the capillary 80 is moved over a particular bond pad 83, and applies a wire ball onto the bond pad. The capillary is then moved toward a particular lead 85 and thereby forms a wire between the bond pad and the lead. Then, feeding of wire into the capillary 40 is stopped and the capillary is moved away from the chip package 80, before being moved over another bond pad to repeat the sequence. Column 5, line 46 – column 6, line 20.

Koduri fails to teach or suggest a “device [that] forms a first wire bond from a first surface to a second surface, and forms a second wire bond from said second surface to a third surface” such that the “first and second wire bonds are electrically connected on said second surface.” Koduri, to the contrary, teaches forming single wires between respective bond pads and leads. Moreover, Koduri fails to teach or suggest that the “second wire bond is formed at an angle with respect to said first wire bond in a horizontal plane.” The Office Action refers to “vertical and rotation” movement of Koduri, but this refers to Koduri’s positioning of the capillary between forming individual wire bonds – it does not teach the above-quoted limitations of claim 42.

For at least these reasons, claim 42 is allowable over Koduri. Claims 43-46, 48 and 49 depend from claim 42 and contain every limitation of claim 42. Claims 43-46, 48 and 49 should be allowed for at least the same reasons as for allowance of claim 42, and also because the unique combinations recited by these dependent claims are neither taught nor suggested by Koduri. For example, claim 48 recites that the “second wire bond is formed at an angle with respect to said first wire bond in a vertical plane.” Koduri fails to teach or suggest this limitation, and this is an additional reason for allowance of claim 48.

Claim 50 recites an apparatus wherein a “device forms a first conductive bump on a first conductive surface, a first ball bond on a second conductive surface, [and] a first wire bond from said first ball bond to said first conductive bump.” Claim 50 further recites a “second conductive bump on a third surface, a second ball bond on said second

conductive surface in electrical communication with said first conductive bump, and a second wire bond from said second ball bond to said second conductive bump.” An example of the structure formed by the claimed apparatus is illustrated and described, for example, in Figure 5B and associated text of the specification. The claims are not limited by the disclosed embodiments.

Koduri fails to teach or suggest these limitations, nor does the Office Action address where Koduri teaches these limitations. As discussed above, Koduri merely teaches forming a ball on a bond pad, and extending a wire to a corresponding lead. For at least these reasons, Koduri fails to teach or suggest the above-quoted limitations of claim 50, and claim 50 is considered to be in condition for allowance.

Claims 51-57 depend from claim 50 and contain every limitation of claim 50, and should be allowed at least based on the reasons for allowance of claim 50, and for other reasons. For example, claim 56 recites that the “second wire bond is formed at an angle with respect to said first wire bond in a horizontal plane.” As discussed above with respect to claim 42, Koduri fails to teach or suggest these features, and this is an additional reason for allowance of claim 56.

Claims 42-46 and 48-57 stand rejected under 35 U.S.C. 102(b) as being anticipated by Bonham, Jr., U.S. Patent No. 4,445,633 (hereinafter “Bonham”). Reconsideration is respectfully requested for the following reasons.

Bonham relates to a wire bonder for controlling the configuration, or shape, of a wire bond. Bonham discloses, with reference to Figure 1, a bonder head 10 having a capillary 19 which forms a wire bond between an IC chip 11 and substrate 12. The crux of Bonham is control of the angle at which the capillary, and thus the resulting wire, is moved from the IC chip 11 toward the substrate 12. See Figures 3 and 4, and associated text of Bonham. As far as interrelation between two wires, Bonham teaches only that a “plurality of wire interconnections are made from a plurality of first points on a component to a corresponding plurality of second points on a substrate.” Column 5, lines 55-58.

Bonham fails to teach or suggest, as recited in claim 42, a “mechanism for moving and operating [a] device such that [the] device forms a first wire bond from a first surface to a second surface, and forms a second wire bond from said second surface to a third surface” such that the “first and second wire bonds are electrically connected on said second surface,” and that the “second wire bond is formed at an angle with respect to said first wire bond in a horizontal plane.” For at least these reasons, claim 42 and claims 43-46, 48 and 49 dependent therefrom are allowable over Bonham.

Also, Bonham fails to teach or suggest, as recited in claim 50, that a “device forms a ... a first wire bond from said first ball bond to said first conductive bump, ... a second ball bond on said second conductive surface in electrical communication with said first conductive bump, and a second wire bond from said second ball bond to said second conductive bump.” For at least these reasons, claim 50 and claims 51-57 dependent therefrom are allowable over Bonham.

Based on the foregoing, Applicants respectfully request that the outstanding rejections be withdrawn, and the application is passed to issue.

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